THURSDAY, MARCH 28, 1895.

ORB-WEAVING SPIDERS OF THE UNITED STATES.

American Spiders and their Spinning Work; a Natural History of the Orb-weaving Spiders of the United States, with Special Regard to their Industry and Habits. By Henry C. McCook, D.D. Vol. iii., with descriptions of orb-weaving species and plates (pp. 1–284, pl. 1–30). (Published by the Author, Academy of Natural Sciences of Philadelphia, A.D. 1893.)

VOLS. i. and ii. of this work have been already noticed in these columns. (See NATURE, vol. xlii., p. 244, 1890; *Ibid.* xliii., p. 74, 1890.) The volume before us completes the work, and bears date 1893; but it was only issued to the public at the end of 1894. To the general reader this is a matter of little consequence, but to the specialist it is often important, for it frequently happens, as in this instance, that new genera and species are characterised and described; it then often becomes necessary to decide, on the questions of priority that may rise, as exactly as possible when such descriptions were made, and the date inscribed on the work, it is manifest, cannot be implicitly relied upon.

In the preface to the present volume, it is stated that the work has engaged the author's thoughts for more than twenty years, and to this the amount of research and observation testified to in three large volumes amply bears witness. The first six chapters of vol. iii. (pp. 1–131), being part i., are a kind of supplement to vols. i. and ii., and are "on various natural habits and physiological problems" of spiders. Part ii. (pp. 132–277) carries out the prospectus of the work at first issued, viz. *descriptions* of the American "orb-weavers," illustrated by thirty coloured plates of great beauty and accuracy, especially in regard to the anatomical details; two, however, of these plates are of spiders of various groups and species alluded to in the foregoing part of the work, though without special description. The author speaks of this portion of his task (part ii.) as in many respects its most difficult part; but this may be taken as tolerably certain, that though vols. i. and ii. and the first half of vol. iii. will always be the most popular part, the latter portion of vol. iii. will prove of most value to the scientific world. The observation and detailing of habits, manners, and general economy, whether of spiders or any other group in the natural world, afford unlimited scope for imagination, sentiment, as well as popular and picturesque description, all of which the true scientific worker has resolutely and wholly to shun, or, at any rate, to repress with a strong hand. It seems almost a pity that these two distinct portions of Dr. McCook's work had not been issued separately, as the total cost of the whole—50 dollars—is a heavy sum to pay for the 136 pages and thirty plates, which will alone be indispensable to the systematic working araneologist. Nor will it be possible (we are told in this vol.) to obtain vol. iii. apart from the other two.

All that was said in the notices, above alluded to, of vols. i. and ii. can be again here repeated in praise of the execution of the work in this third volume. Chap. i. is "on toilet, drinking, and social habits"; chap. ii. on "memory, mimicry, and parasitism"; chap. iii., "biological miscellany"; chap. iv. "on weather prognostications, sundry superstitions, and the commercial value of spiders' silk"; chap. v., "on moulting habits of spiders"; chap. vi., "regeneration of lost organs, and anatomical nomenclature." On all these subjects there are many most interesting and useful observations.

In chapter i., p. 1, speaking of spiders' habits of cleansing themselves of objectionable matters by their having a spiny armature of the legs and mandibles (*falces*), so evidently well adapted for the purpose, it is asked, "Did the habit of cleanliness arise from the possession of these implements, or were the implements developed out of the vital necessity for a cleanly person?" In the first place, it suggests itself as hardly tenable to assume, *à priori*, such a vital necessity in respect to spiders, any more than with regard to some Acarids, or the larvæ of certain insects, whose habit it seems to be not only to need no cleansing, but to encourage the accumulation upon their bodies of various kinds of adventitious and, at times, of even excrementitious matter; but not to dwell on this view of it, the case of the spiders might perhaps be simply presented in this way. The accumulation of dust, or soil, or what not about them, arises mainly from their having clothing and spinous armature, in which those substances become entangled and retained, while at the same time those very causes of the inconvenience become the means of obviating it; for we may take it that the first efforts of a sentient being are to rid itself of whatever may adhere to it, to its hindrance or annoyance; in this process, whatever existing portion of structure came handiest would necessarily be the first used, whether, as in the case of cows and other horned cattle, the lashing of its sides by a heavily-tipped tail, or the muscular movements of the ears, or the action of the hinder hoofs; but it would scarcely be argued, either, that the ears, tails or hoofs of cows were developed just for the purpose of ridding them of insect or other inconveniences, or that the habit of so using them arose out of the animals' possession of ears, tails, and hoofs. Nor can we, it is conceived, argue either that spiders' habits of using hairs and spines in cleansing themselves arose from the possession of such implements, nor that these implements were developed from those habits. All that we can say with any certainty, seems to be that while hairs and spines, &c., were developed by various means and for various ends, the more perfect adaptation of some of them for special functions would no doubt be effected by natural selection; such, for instance, as the development of the calamistrum on the metatarsi of the fourth pair of legs in numerous widely separated genera, and even families of spiders for the utilisation of the silk-matter of the supernumerary spinners, which last are always found correlated with the calamistrum. Under the heading of "Burrowing Spiders," pp. 31-35, we have a very interesting and important account of trap-door nests made by Lycosid spiders; those hitherto known as "trap-door spiders" having been exclusively of the family Theraphosidæ. A remarkable account of a spider apparently voluntarily changing its colour, is given at p. 51. This account, it seems, is taken from NATURE, April 13, 1893, p. 558; but it appears to need corroboration.

Among other points in respect to spiders' spinning work, the use and commerical value of the product is naturally referred to (pp. 83-89), and the various experiments (already published from 1709 to the present time) made to ascertain their use and value are noted; but the subject does not seem to have attracted much attention since Prof. Wilder's experiments in 1865-1869. Some subsequent researches made by a Mr. Stillbers, an Englishman (quoted in a paper by M. Guatier), appear to need more circumstantial reference and explanation. It may, however, be mentioned here, that in 1884 a small mass of spider's silk was received, through Prof. Thiselton-Dyer, by the present writer, from Almora, Saharunpur, India. This was mixed up with the débris of dead insects and spiders, as well as with portions of the plants among which the silken webs were spun. Some of this mass was examined by Mr. Thomas Wardle, who reported upon it in the *Journal* of the Society of Arts, May 1885 (pp. 679-680). In an exhaustive paper in that journal, on "Researches on Silk Fibre," Mr. Wardle says, in the course of his report:—

> "I believe, if it can be obtained in quantity, it might be packed in bales and sent to England, where it would readily find a market for being carded and spun into silk threads for sewing or weaving purposes. It is difficult to estimate its market value. I dare say it would, at any rate, realise one shilling to two shillings per lb. It is rather dirty, and this would to some extent detract from its value as compared with silk waste."

The spider to which this silken mass was referable is *Nephilengys* (*Epeira*) *Malabarensis*, Walck., a species of very wide tropical distribution, and apparently in great abundance where it occurs. There seems to be no reason why almost any amount of this silk should not be obtainable from the low plants and scrub on which the spiders spin their snares, and, with a little care in gathering, much less intermixed with dirt and other adventitious matter than the sample above alluded to. In fact, we may easily conceive that it would be possible, with a little trouble, to form a kind of spider-farm for the purpose of producing this silk in the greatest possible perfection and abundance. From Mr. Wardle's analysis and treatment of this silk, it may be seen that it possesses some very valuable and curious characters.

The chapter on "Moulting Habits" is full of exceedingly interesting details, both from published works and the author's own observations. Moulting is a critical operation in spider-life, and is usually attended with a great demand on the vital powers of the spider; and though spiders probably seldom succumb when in a state of nature, moulting, when in confinement, frequently proves fatal, especially when the spider is advanced in age. A large Theraphosid, for eighteen months kept in confinement in the gardens of the Zoological Society of London some few years ago, died at length in its last moulting process. After the last moult, which completes the structural development of the spider, it seems that no further ecdysis takes place, whatever age the spider may attain. The number of moults appears to vary, not only with the species, but with individuals of the same species; food, temperature, and other conditions no doubt affecting it. Chapter vi., on "Regeneration of Lost Organs," is based chiefly on the researches of Voldemar Wagner ("La régeneration des organes perdus chez les Araignées," *Bull. Soc. Imp. Moscow*, 1887, No. 4) and the observations of H. Heineken (*Zool. Journ.* iv. 1828–29). Papers on the subject by the late Mr. Blackwall are also noted.

Part ii. consists of "Descriptions of Genera and Species." In his introductory remarks to this part, Dr. McCook defines the extent of the group comprised in his "Orb-weaving Spiders." This is coextensive with the "Orbitelariæ" of Dr. Thorell, and includes *Uloborus*, which is far removed structurally from the *Epeiridæ*, as well as *Pachygnatha*, which, so far as known, spins no snare at all. The difficulty of drawing any decidedly marked line between the *Retitelariæ*, and *Orbitelariæ* is no doubt great. Witness the results arrived at by M. Eugène Simon in his work now in progress—"Histoire des Araignées," second edition, 1893–4—in which these two enormous groups are fused, and again subdivided; the materials being recast in a way which upsets all the previously conceived ideas of araneologists. However, until these new views are better understood and generally adopted, the old division into geometric web weavers and those whose snares are not geometric, but net-like, with exceptions such as the *Uloboridæ* and *Pachygnatha*, are sufficient for popular as well as faunistic purposes.

At pp. 8 and 133, reference is made to drawings of American spiders made by John Abbott early in the present century, and the descriptions of which are contained in Baron Walckenaer's Ins. Apt., A.D. 1837. It appears from Dr. McCook's remarks that he was under the impression that some drawings which he saw in the British Museum in 1887 were the original drawings of John Abbott's spiders. This, however, is not so. The British Museum set of drawings are either a copy of those of Abbott, or, may be, a duplicate set done by Abbott himself. The originals (or, at any rate, those from which Walckenaer drew up his descriptions of the spiders) are in the possession of the authorities at the Jardin des Plantes, Paris. Many years ago it was proposed to the present writer by the late Dr. John Gray, of the British Museum, to prepare and publish descriptions of the spiders from the British Museum copy, along with plates engraved some years previously from that copy, under Dr. Gray's orders. Such descriptions, however, it is quite obvious, could not possibly be done satisfactorily from the drawings alone—witness Baron Walckenaer's efforts—though no doubt numbers of the spiders delineated can, with more or less certainty, be specifically determined from them. The result of an inquiry made at that time, was that the French nation has Abbott's original drawings, which were presented, directly or indirectly, to Baron Walckenaer by Abbott himself; but what the British Museum set was, or how it was acquired, seemed to be very doubtful.[1]

In a general notice like the present, part. ii. of the vol.

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[1] Dr. McCook evidently was not aware that the present writer, in a review of N. M. Hentz's "North American Spiders" in 1876 (NATURE, vol. xiii. p. 282), mentions these facts and considerations respecting John Abbott's drawings.

under consideration needs but little remark. The descriptions are full and accurate, and the figures are nearly all engraved from drawings beautifully executed by Miss Elizabeth F. Bonsall, and leave but little to be desired. Three, however, of the plates—Nos. 2, 10, and 15—are from the author's own drawings, and are fully equal, if not superior, to the rest. 123 species of spiders of the orb-weaving group are described, and, of these, twenty-four are considered to be new to science. Four new genera are also characterised. In every way, part ii. will be of great use and importance to systematic araneologists. A portrait of Nicolas Marcellus Hentz (justly called the father of American araneology) forms a most appropriate frontispiece. O. P. CAMBRIDGE.

THE SEA AND ITS COASTS.

Sea and Land, Features of Coasts and Oceans, with special reference to the Life of Man. By N. S. Shaler, Professor of Geology in Harvard University. Illustrated. (London: Smith, Elder, and Co., 1895.)

IN more than one sense this book is a thinner one than "Aspects of the Earth." Of the seven essays which it contains—in the main republications—the first four deal with familiar subjects—the work of the sea, its beaches, its depths, and icebergs; the last three treat of harbours, and introduce some questions which are less hackneyed and more interesting. Prof. Shaler writes pleasantly, and his sentences flow easily, but it is sometimes possible to read through several paragraphs without much progress in knowledge, or to find a rather large number of well-turned phrases expended in stating what amounts to a truism. But as the preface informs us that the object of the book is "to introduce unprofessional students of nature to certain interesting phenomena of the sea-shore and of the depths of the ocean," it is very possible that babes in science will find well-sweetened pap more digestible than strong meat. We must, however, protest against the liberties which Prof. Shaler takes occasionally with our mother-tongue. He is too fond of "telephonese" or "telegraphese," as it might be called This tongue may be good American, but it is not good English. We do not mean to assert that no improvements could be made in the latter, or to pose as prudes of etymological purity, but we object to the coinage of new words, or, rather, the misuse of old words, where grammatical expressions already exist, longer only by a few more letters or, at most, syllables. Brevity may be the soul of wit, but it is not always an adornment in speech. Is there any real gain (to take a few examples) in such an adjective as "pivotal," such participles as "fiorded," "forested," "peninsulated," "well-harboured" (*i.e.* with many harbours), and such a verb as to "raft off" in the sense of transport or carry off like a raft.

Prof. Shaler is a picturesque writer, and his descriptions usually are clear and vivid; but dangers lurk in the attempt to be graphic when a locality is known only at second-hand. Of this the book before us affords an amusing instance. Speaking of the advance of dunes, he quotes the well-known case of Eccles (Norfolk), saying: "Thus in Britain one of these dunes in the last century invaded the village of Eccles, and buried the dwellings and the parish church, so that even the top of the spire was hidden. After a number of years the summit of the church began to reappear on the leeward [? windward] side of the hill, and in time the remote descendants of the dispossessed people may be restored to their heritage." But the dwellings had practically disappeared before the dunes rolled over them: the church had been a ruin for at least two centuries; of its body only the foundations remained; there was no spire, and apparently never had been one; and the octagonal lantern of the tower was never wholly buried, unless the well-known engraving in "Lyell's Principles of Geology" represents an exceptional condition of the sandhills. So if the descendants of the original villagers do return to their ancestral domiciles, they will find themselves "Lords of the sands, an heritage of waves." Indeed, since Prof. Shaler wrote, even the old tower has tumbled down, destroyed by the waves during a gale last January.

We venture also to think that Prof. Shaler takes rather too much for granted in assuming, without a hint that this has been disputed, that great rock basins have been excavated by glaciers. Moreover, he is hardly correct in saying that fjords are restricted to ice-worn regions, for Cornwall can show more than one very respectable imitation of such an inlet, and on the Dalmatian coast they are not rare; yet we can hardly suppose that even in the coldest part of the Great Ice Age, precipitate glaciers descended from the Montenegrin Highlands to scoop out the Bocche di Cattaro. But perhaps an inlet of the sea only becomes a fjord when it shallows towards its mouth; if so, that should have been clearly stated. Doubtless these basin-like fjords are difficult to explain; but as Prof. Shaler admits the existence of submerged moraines, no excavation need be required. At any rate it would be well, as a preliminary step, to prove that glaciers are agents of excavation to any important extent, for this has been denied by many geologists, who vainly ask to be shown any proofs of such effects in the subaërial part of their course.

But we must not dwell too much on blemishes, which after all are light. Even the four earlier essays, already mentioned, exhibit a certain freshness, for Prof. Shaler, as an American, selects the majority of his examples from the other side of the Atlantic, instead of using those which have become the stock-in-trade of every European geologist. By this means more than one point is brought out more clearly than is usual in English books, because illustrations are difficult to obtain from our own islands, or any readily accessible part of the neighbouring continent. For instance, his remarks on the action of vegetation in a shallow estuary or bay, and particularly on the growth of "mangrove swamps" are valuable. He describes how the large tapering cylindrical seed of the mangrove, floats in a vertical position, settles down and becomes entangled on the bottom by means of the numerous hooklets which arm its lower extremity, then sends a shoot up above the surface of the water, from which come wide-spreading, low-growing branches. From these long runner-like processes are thrown off, which at last curve sharply downwards through the water till they strike root at the bottom, and then support new crowns, each having its own trunks